CE 246 STRENGTH OF MATERIALS
Required Course
Spring 2009

Instructor(s): Name: Kutay Orakçal, Hilmi Luş
Office No.: M 3165, M 3175
Phone No.: 359 7616, 359 6594
Course Data: Hours: MM 56, ThTh 78
Room: Orakçal MM: M2171, ThTh: M2170, Luş MM: M2180, ThTh: 2180

Course Description (Catalog):
CE246 Strength of Materials (4+1+0)4

Prerequisite: CE 245 Mechanics

Course Objectives (Learning Outcomes):
To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.

To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.

To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading.

To build the necessary theoretical background for further structural analysis and design courses.

Textbook:

Reference Books:

Curricular Context
This required course constitutes a transition from fundamental math and science topics to specific applications within the context of structural mechanics and engineering. It provides the foundation for advanced design and structural analysis courses. Estimated design content of the course is 30%.

Laboratory and Computer Usage:
N/A

Class Policies:

Homework and Quizzes: Homework questions to be assigned from each chapter. Unannounced quizzes to be held almost weekly. Quizzes will be based on homework assignments. 20% of the course grade.

Midterm exams: Two exams, each 20% of the course grade.

Final exam: Comprehensive exam at the end of the semester, 40% of the course grade.

Contribution of the Course to Program Outcomes:
(a) An ability to apply knowledge of mathematics, science and engineering
(c) An ability to design a system, component, or process to meet desired needs such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(e) An ability to identify, formulate and solve engineering problems
(k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Course Assessment:
Course will be assessed on the basis of the accomplishments regarding the course objectives and the contributions to the program outcomes. The evaluation will consist mainly of the responses from the students, who will provide their comments to various course related questions in the final week of the semester.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Reading Assignment</th>
<th>Homework Assignment</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Torsion</td>
<td>Chapter 5</td>
<td>Homework IV</td>
<td>Biaxial bending. Eccentric axial load. Composite beams.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>Midterm I</td>
<td>Shear stresses in beams. Transverse shear and the shear formula. Limitations of the shear formula. Shear flow and shear center.</td>
</tr>
<tr>
<td>8</td>
<td>Stresses and deflections in beams</td>
<td>Chapters 6, 7, 12</td>
<td>Homework VII</td>
<td>Design of beams.</td>
</tr>
<tr>
<td>11</td>
<td>Transformation of stress and strain</td>
<td>Chapters 9,10</td>
<td>Homework X</td>
<td>Energy methods Chapter 14</td>
</tr>
<tr>
<td>12</td>
<td>Buckling of columns</td>
<td>Chapter 13</td>
<td>Homework XI</td>
<td>Energy methods</td>
</tr>
<tr>
<td>13</td>
<td>Energy methods</td>
<td>Chapter 14</td>
<td>Homework XII</td>
<td>External work and strain energy. Principal of virtual work. Castigliano’s theorem.</td>
</tr>
</tbody>
</table>